

II. "Preliminary Report on the Results obtained with the Prismatic Camera during the Total Eclipse of the Sun, April 16, 1893." By J. NORMAN LOCKYER, C.B., F.R.S.
Received February 22, 1894.

(Abstract.)

During the total eclipse of 1871 observations were made by Respighi and the author with a spectroscope deprived of its collimator, and a series of rings was seen corresponding to the different rays emitted by the corona and prominences. A similar instrument, arranged for photography, was employed during several succeeding eclipses, but the photographs were on so small a scale that none of the results came up to the expectations raised by the observations of 1871. As the Solar Physics Committee is now in possession of a prismatic camera of 6 inches aperture, the prism having a refracting angle of 45° , it was determined to employ it during the eclipse of 1893. The instrument was placed at the disposal of the Eclipse Committee by the Solar Physics Committee, and was entrusted to Mr. Fowler, who took the photographs at the African station.

It also seemed desirable that a series of similar photographs should be taken at another point on the line of totality, even though an equally efficient instrument were not available. A spectroscope with two 3-inch prisms of 60° , used in conjunction with a siderostat, accordingly formed part of the equipment of the expedition to Brazil, and was placed in charge of Mr. Shackleton.

The present preliminary report is intended to indicate the kind of results obtained, and some of the photographs are reproduced for the information of those specially interested, as it will be some time before the complete reductions are ready for publication.

At the African station 30 plates were exposed, 15 during totality, and the remainder in the five minutes before and after totality. In Brazil 17 plates were exposed during totality, and 7 out of totality.

The most conspicuous lines, or rather portions of circles, seen in the photographs taken during totality, are the H and K lines of calcium, and in these rays the images of the various prominences are very clearly outlined.

The lines of hydrogen, extending far into the ultra violet, are also very prominent, and numerous other lines are seen in addition.

Isochromatic plates were used for some of the exposures, and on some of these the ring formed by the characteristic line of the coronal spectrum (1474 K) is clearly depicted, especially in the Brazilian photographs. A comparison with the photographic records of the corona shows that the prismatic camera has picked out the brightest

parts of the corona in this way. All the photographs show a bright continuous spectrum from the inner corona.

Some of the plates taken out of totality show numerous bright lines at the cusps of the crescent of the sun then visible, chief among them being the lines of hydrogen and the H and K lines of calcium; others, farther removed from the second and third contacts, show only the Fraunhofer lines.

III. "Researches on Modern Explosives.—Preliminary Communication." By WILLIAM MACNAB, F.I.C., F.C.S., and E. RISTORI, Ass. M. Inst. C.E., F.R.A.S. Communicated by Professor RAMSAY, F.R.S. Received February 28, 1894.

During the last two years we have carried out a long series of experiments with explosive compounds for the purpose of studying chemical reactions at high temperatures and pressures, and of elucidating certain thermal constants relating chiefly to the specific heat of gases under such conditions.

For these experiments we have principally used nitro-glycerin, nitro-cellulose, and several combinations of these two bodies which are used as smokeless gunpowders, for the reason that such modern explosives offer the advantage of not only presenting comparatively simple chemical reactions, owing to the absence of solid residue, but also of enabling considerable variations to be made in their composition so as to vary the proportions of the elements reacting.

We also expected that the results which we obtained would make a small contribution to the knowledge of explosives in general, following up the lines indicated by the published work of Noble and Abel, Berthelot, Sarrau, Vieille, and others.

In this preliminary communication we propose chiefly to indicate the results obtained in the measurement of the heat evolved by explosion, and of the quantity and composition of the gases produced by this metamorphosis.

We have also made considerable progress towards the determination of the actual temperature of explosion, and we have succeeded in recording these high temperatures by photographic means, but, as this work is not yet completed, we shall not further refer to it in this paper, but we hope it will make the subject of another communication at an early date.

These modern explosives, and especially the smokeless powders, have assumed of late such importance that it may be of general interest to give here a brief sketch of their development.

About thirty years ago experiments were made in Austria with the